

Sustainable Supply Chain Management Practices and Organizational Performance of Public Institutions in Rwanda: A Case of Kigali City

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Abstract: Despite numerous efforts made by Kigali City as a public institution through the management of the use of sustainable supply chain management in terms of sustainable sourcing, green recycling, and clean energy efficiency, the performance remains critical and inadequate. Therefore, the general objective of this research project was to analyze the effect of sustainable supply chain management practices on the organizational performance of public institutions in Rwanda. The following were the three specific objectives of the study: To examine the influence of sustainable sourcing on performance of Kigali City; to analyze the effect of green recycling on performance of Kigali City, to analyze the influence of clean energy efficient on performance of Kigali City as well as to analyze the effect of transportation and urban on performance of Kigali City. To achieve these objectives, literature was reviewed on the subject matter, and two theories was aligned with this research, including resource dependency theory as well as theory of empowerment. Data was collected from 138 employees of Kigali City and they were chosen by using the census sampling technique. Questionnaires, interview guides, and documentation were used as tools for data collection. The data was analyzed using both descriptive and inferential statistics by presenting the findings of respondents through the mean and standard deviation. Findings indicated that holding all the stakeholders management to a constant zero, rehousing project performance will be -.889 percent, a unit increase in the use of sustainable sourcing would lead to increase the performance of City of Kigali at 41.7%, a one percent increase in the use of green recycling would lead the performance of City of Kigali at 61.1%, a one percent increase in the use of clean energy efficient would lead to an increase the performance of City of Kigali at 61.1%, furthermore a one percentage increase in the use of transport and urban planning would lead to 22.2% increase the performance of City of Kigali. Overall, both the Green recycling and Clean energy efficient had the greatest effect on the performance of City of Kigali, followed by sustainable sourcing, as well as transport and urban planning. At 5% level of significance and 95% level of confidence, transport and urban planning had 0.048 level of significance; green recycling had a 0.002 level of significance, sustainable sourcing had a 0.004 level of significance and finally clean energy efficient had 0.007 level of significance.

Keywords: Sustainable Supply Chain Management Practices, Organizational Performance, Public Institutions.

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I. INTRODUCTION

Sustainable procurement in Africa is crucial because of the continent's susceptibility to climate change, linked to its reliance on natural resources and environmental decline. These practices are important for safeguarding ecosystems and ensuring long-term economic viability. It is necessary to develop operational tools that incorporate environmental factors into procurement and to adopt strategies that manage demand and encourage Green Public Procurement (GPP) practices (Ogbu et al. 2023). To assess value for money, GPP

requires the inclusion of green criteria in procurement processes, affecting all stages from supplier selection to contract performance. While implementation may seem challenging, various countries and organizations have developed resources to facilitate environmentally friendly purchasing, easing the burden on procurers (Kumar, 2022).

At the regional level, sustainable procurement strategy supports the United Nations' (UN) objective of progressively becoming environmentally sustainable and climate neutral (Mudoola, 2021). Sustainable procurement is made easier in

public procurement when environmental, economic, and social factors are taken into account while purchasing goods and services (van Berkel & Schotanus, 2021). However, there are still issues with supplier awareness, enforcement mechanisms, and standardized criteria across different sectors. Sustainable procurement is also gaining momentum, with several countries, including Rwanda, Kenya, and Uganda, actively developing and implementing green public procurement (GPP) guidelines.

At national level, Rwanda's dedication to incorporating environmental, social, and economic sustainability factors into public procurement processes is reflected in the adopted policy framework, which places the nation at the forefront of responsible procurement practices in Africa (Mukeshimana et al. 2021). Additionally, the Rwandan government sets the broad guidelines and goals for sustainable public procurement and seeks to use its purchasing power to support local businesses, encourage innovation, and advance sustainable practices (Chidama & Ononiwu, 2023). The Rwandan government aims for a more equitable and environmentally sustainable economy through the Sustainable Public Procurement Policy Framework. In Kigali City, this framework establishes guidelines for sustainable public procurement, leveraging purchasing power to support local businesses, foster innovation, and promote sustainable practices (Behraves et al. 2022). The Rwandan government's ambition for a more equitable and environmentally friendly economy is reflected in the adoption of the Sustainable Public Procurement Policy Framework.

➤ *Statement of the Problem*

Sustainable practices contribute to a healthier planet by preserving natural resources, reducing the effects of climate change, and safeguarding ecosystems (Yadav & Singh, 2024). Despite numerous efforts made by Kigali City as a public institution through the management of the use of sustainable supply chain management in terms of sustainable sourcing, green recycling, and clean energy efficiency, the performance remains critical and inadequate. In 2022, the City of Kigali also imported and purchased other equipment worth Rwf 81.9 million, including air conditioners in the offices of other departments operating under Kigali City, but most of them were found to be indifferent to environmental protection and climate change protection. In December 2023, Kigali City also imported and purchased other equipment worth Rwf 89.2 million, some of which was also found to be not resistant to climate change protection (Kigali City Annual Report, 2023).

As highlighted by the Office of General Auditor (2023), it indicated that many Rwandese suppliers sometimes offer competitive prices without sacrificing quality, as well as identifying and managing risks from indirect relationships that vendors might have, and finally, some other Government business entity (GBEs) have storage fees and other hidden costs challenges. As highlighted by Sahoo & Goswami (2024), achieving openness and accountability, as well as striking a balance between cost and quality, are major issues with choice supplier in the public sector. Supply chain sustainability, as described by Akbari et al. (2024), extends

beyond traditional focus on delivery and costs by incorporating environmental and social considerations as key elements for financial success. This strategic approach promotes long-term growth and profitability. Therefore, from the above studies conducted by other authors, the researcher found that there are not enough studies focused on how of sustainable supply chain management practices affects the public organizational performance; therefore, the researcher is needed to fill this gap by assessing the effect of sustainable supply chain management practices on organizational performance of public institutions in Rwanda with reference to the Kigali City as a case study.

➤ *Objectives of the Study*

The general objective of this study was to analyze the extent to which sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda, a case of Kigali city. Specific objectives were:

- To examine the influence of sustainable sourcing on performance of Kigali City.
- To analyze the effect of green recycling on performance of Kigali City.
- To analyze the influence of clean energy efficient on performance of Kigali City.
- To analyse the effect of transport and urban planning on performance of Kigali City.

➤ *Research Hypothesis*

- H₀₁: There is no significance relationship between sustainable sourcing and the performance of Kigali City.
- H₀₂: There is no significance relationship between green recycling and the performance of Kigali City.
- H₀₃: There is no significance relationship between clean energy efficient and the performance of Kigali City.
- H₀₄: There is no significance relationship between transport and urban planning on performance of Kigali City.

II. LITERATURE REVIEW

Amirian et al. (2022) noted that supply chain management (SCM) encompasses a number of ideas, including environmental or green SCM, which entails businesses aiming to reduce adverse environmental effects in their supply networks. It also takes into account social concerns in the supply chain, such making sure workers have respectable working conditions or that products are acquired, produced, and delivered to customers in an ethical manner. Additionally, SCM's economic component may involve purchasing from regional vendors in order to promote economic revitalization in the area (Mahmood et al. 2024).

➤ *Sustainable Procurement*

In order to ensure that procurement procedures and decision-making still satisfy stakeholder criteria, sustainable procurement incorporates environmental, governance, and social aspects of corporate responsibility (Aichbauer et al. 2022). It strives for the best social outcomes and the least amount of environmental effect. Sustainability in supply chain and procurement refers to the process of adopting choices that minimize environmental effect while benefiting the firm and society at large.

➤ *Sustainable Sourcing*

The goal of sustainable sourcing is to meet present requirements without sacrificing the potential of future generations to do the same by prioritizing environmental, social, and economic sustainability across the supply chain (Mahmood et al. 2022). It is crucial for maintaining ethical corporate practices and fostering a more sustainable future. The goal of sustainable sourcing is to find and choose suppliers that share this commitment and who can prove they adhere to particular labor, environmental, and social responsibility requirements.

➤ *Green Recycling*

The process of recycling involves turning waste materials into new products and materials (Krauklis et al. 2021). The recovery of energy from waste items is frequently included in this notion. A material's capacity to regain the qualities it possessed in its initial state determines how recyclable it is. It is a material-saving and greenhouse gas emission-reducing substitute for "conventional" garbage disposal (Gautam & Agrawal, 2021). Additionally, it can limit the use of fresh raw materials and prevent the disposal of potentially valuable materials, which can lower energy use, air pollution from incineration, and water pollution from landfilling. Recycling is the third step in the waste hierarchy and is a crucial part of contemporary waste reduction (Yazdani & Lakzian, 2023).

➤ *Clean Energy Efficient*

Clean energy efficiency is the process of using energy sources that produce few or no harmful emissions while also maximizing the amount of productive work done per unit of energy used (Razmjoo et al. 2021). This essentially means reducing energy waste and maximizing the environmental advantages of clean energy sources, like wind or solar power; it's about the energy source's quality and efficient use, which significantly improves sustainability by reducing greenhouse gas emissions and pollution.

➤ *Transport and Urban Planning*

Green supply chain management (GSCM), which attempts to include environmental considerations into the entire supply chain from sourcing to final delivery and reverse logistics, depends heavily on the roles of transportation and urban planning (Ba Awain, Al-Ansi & Jaboob, 2023; Zhaolei et al., 2023). Green logistics is the new term for transportation, which is the logistics industry's biggest source of carbon emissions (IEA, 2020). For the crucial "last-mile" delivery in cities, this entails actions like switching to low-emission modes of transportation (like rail

or the sea), optimizing routes to reduce distance and traffic, raising vehicle load factors, and implementing alternative energy vehicles (like electric fleets) (Huge-Brodin et al., 2020; Fahimnia et al., 2015a).

➤ *Public Organizational Performance*

The ability of an organization to accomplish objectives in a constantly changing environment is known as institutional performance in today's workforce (Harsch and Festing, 2020). According to Nisio et al. (2018), performance management is a leadership approach that uses planning and control cycles to establish objectives and make sure they are met. It consists of a collection of tasks, instruments, and systems for measuring and assessing outcomes in order to constantly enhance performance.

➤ *Efficiency*

Ultimately, it is crucial to consider the total cost of ownership, which is one of the fundamental principles of procurement (Burnham et al. 2021). This covers not just the purchase price but also the time and money spent trying to acquire ownership. The actual cost of obtaining any commodity or service can be better understood by comprehending the procedures involved in procurement (Lardenoije, 2020). It is only possible to determine where the procurement function is operating well and where it needs to be improved when it is well designed. The purchasing function will be commended if costs decrease, and it will be questioned if savings decrease.

➤ *Cost Effectiveness*

The act of reducing costs by improving a process or product is known as cost efficiency. By lowering procurement costs and increasing overall efficiencies, this is done to boost the organization's bottom line (Panigrahi et al. 2022). Cost effectiveness is a crucial component of corporate strategy, even though it isn't the ultimate goal. The key to the value that procurement provides to firms is its capacity to reduce expenses and boost profitability through more efficient operations. It is essential to choose vendors who offer sustainable materials. This satisfies consumer desire for ethical items while also helping the environment.

➤ *Accountability*

Accountability in public procurement refers to officials' responsibility for their choices, actions, and results (Fourie & Malan, 2020). It also implies that they must disclose and answer for the results of their choices and actions. In terms of comprehending accountability and the connections between performance and responsibility in traditional administrative organizations, the corpus of literature now available in the topic is well developed. Nonetheless, a lot of work needs to be done to provide a theoretical understanding of responsibility that goes beyond conventional administrative aspects.

➤ *Value for Money*

Based on the overall cost of ownership, value for money is determined by finding the best possible balance between expenses and benefits. Accordingly, value for money does not always imply that the lowest bidder must get the contract

(Civil Service College, 2021). The phrase "value for money" usually refers to a clear dedication to making sure that the money spent yields the best returns. The usage of this word by the UK government indicates a concern for more accountability and transparency in the use of public monies as well as for making the most of the resources that are available (Barnett et al. 2020).

➤ *Effectiveness*

The effectiveness of public institutions is broadly defined as the degree to which an administrative body achieves its mandated public objectives, designs cohesive policies, and fulfills its programmatic intentions (Gliga, 2026). Unlike private sector entities that focus primarily on profit maximization, public institutions are fundamentally evaluated based on their capacity to generate social benefits and ensure the collective welfare of the citizenry. Contemporary academic literature clarifies that institutional effectiveness is distinct from efficiency; while efficiency involves minimizing resource consumption and maximizing output per unit of input, effectiveness measures the direct ratio of actual social outcomes realized against the benchmarks originally programmed (Serrano, 2025).

➤ *Sustainable Development Theory*

The World Commission on Environment and Development, also called the Brundtland Commission, is widely credited with defining sustainable development theory in their 1987 report "Common Future" (Hajian & Kashani, 2021). Sustainable development theory is an approach to growth and human development that aims to meet present-day needs without compromising the ability of future generations to meet their own needs. The goal is to have a society where resources and living conditions meet human needs without violating the integrity of the planet (Gupta et al. 2024). The goal of sustainable development is to strike a balance between the demands of the environment, the economy, and social welfare.

➤ *Life Cycle Assessment Theory*

The concept of life cycle assessment (LCA) was initially introduced by the Society of Environmental Toxicology and Chemistry (SETAC) in 1990 (Zhang, 2023). In 1993, it was incorporated by the International Standard Organization (ISO) into the ISO 14000 Environmental Management Standards. Because it highlights the significance of assessing the whole life cycle impact of products, the life cycle assessment theory (LCA) is important in sustainable supplier selection (Sakib et al., 2024).

➤ *Resource Based View*

The theory derives primarily from Penrose's 1959 research, in which she identified untouched organizational assets as a key driver of growth (Ogotu et al. 2023). Penrose recognized that internal management resources were both a driver and a constraint on a company's expansion. Based on the managerial strategy literature, a firm's RBV describes, explains, and predicts how a firm can achieve sustainable competitive advantage by acquiring and controlling its "unique" resources and capabilities (Bharadwaj, 2006; Barratt & Oke, 2007).

➤ *Stakeholder Theory*

The term "stakeholder" as we use it today first appeared in a 1963 internal memo at Stanford Research Institute (Eslerod, 2020). The term is intended to challenge the idea that shareholders are the only people management needs to care about. In the late 1970s and early 1980s, scholars and practitioners worked to develop management theory to explain management problems associated with high levels of uncertainty and change. Much of the management terminology developed earlier under the influence of Weber's theory of bureaucracy assumed that organizations existed in relatively stable environments (Almhairat, 2025).

➤ *Conceptual Framework*

A conceptual framework is like a roadmap for the research and also helps the researcher to visualize the research project and put it into practice (Ma et al. 2021). Therefore, the independent variable of this project is related to the sustainable supply chain management practices and the dependent variable is the organizational performance.

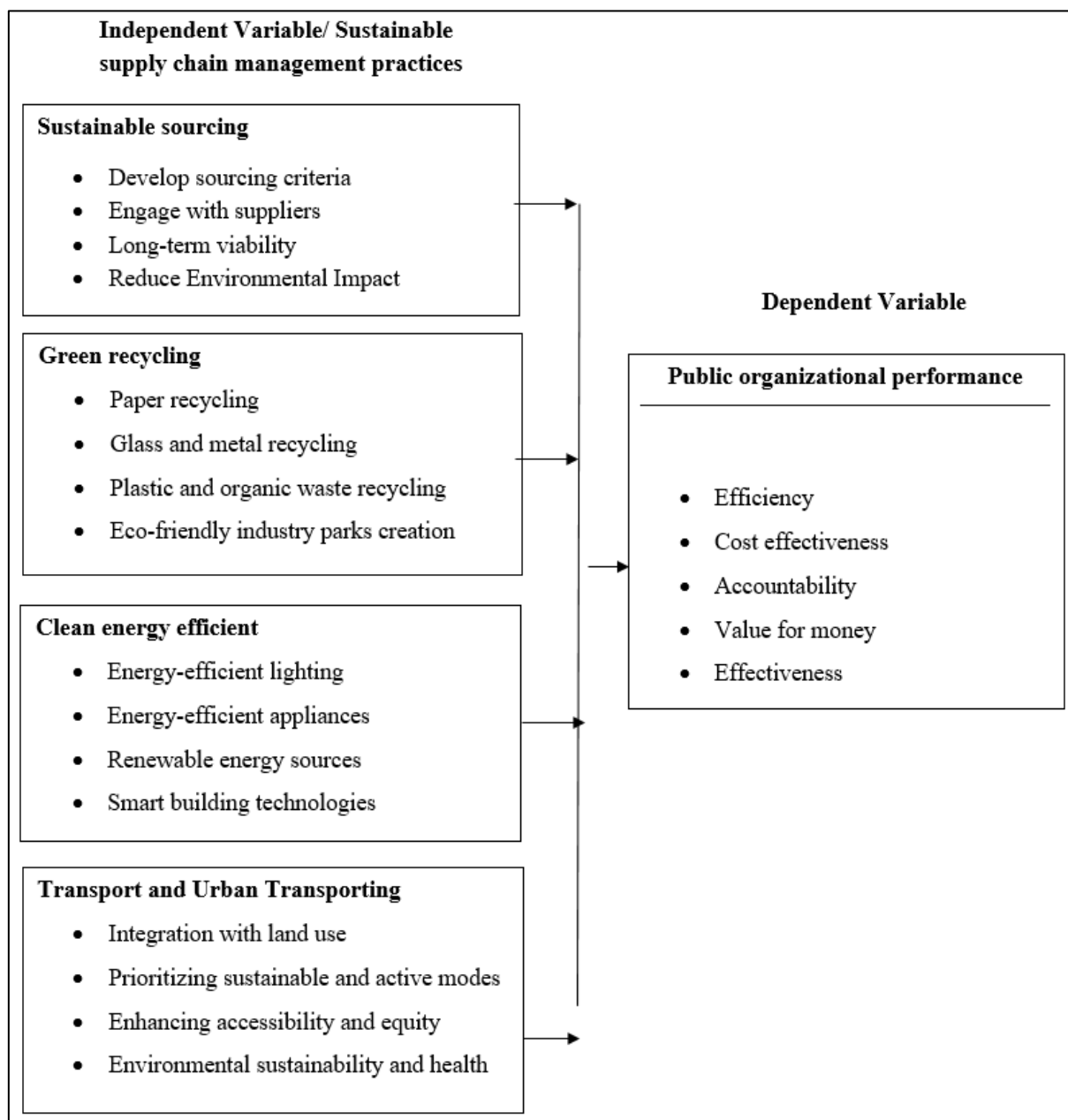


Fig 1 Conceptual Framework

III. RESEARCH METHODOLOGY

➤ Research Design

The study used explanatory research as a research method that explores why something occurs when limited information is available on how sustainable supply chain management practices affect public organizational performance in Rwanda. The data collection questionnaire was based on the following study objectives: the influence of sustainable sourcing on performance of Kigali City, the effect of green recycling on performance of Kigali City and finally the influence of clean energy efficient on performance of Kigali City.

➤ Study Population

Population of the study was 138 employees of Kigali City (CoK) working within different areas, including project management, operations, Monitoring and evaluation

department, Finance & Administration Department, social protection, Accounting, Logistic and purchasing management, procurement and administration Office, Treasury, operations, Customer experience management and Internal audit department.

➤ Sampling Technique

Therefore, the researcher used the universal sampling technique to choose 138 employees of Kigali City because these employees have enough knowledge about the extent to which sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda.

➤ Data Collection Methods and Data Collection Tools

Therefore, in this section, the researcher collects primary data. A questionnaire is a research tool consisting of a series of questions used to collect information from visitors

through a survey or statistical study. Therefore, in this research the questionnaire contained closed-ended questions that limit the answers and opinions of the respondents by using pre-selected options

➤ Data Processing Techniques and Data Analysis

The data collected from the questionnaire was processed and analyzed by using tables and percentages. In order to obtain qualified information, standard checks need to be carried out so that the researcher ends up with real data that clearly reflects the situation being presented. Criteria checking was accomplished through editing, coding, and tabulation. Therefore, in this study the entered data were analyzed using both the descriptive and inferential statistics to generate frequency distribution, percentages, mean, standard deviation, and correlation. The researcher interpreted the results in light of the research objectives. In addition, in order to analyze the performance of Kigali City, the researcher used a multiple linear regression model, assuming that there is a linear relationship between the dependent variable Y (performance of Kigali City) $Y = \alpha + \beta X + \varepsilon$ and the independent variable X (sustainable supply chain management practices), where the error term ε contains missing factors. The formula for multiple linear regression that was used is $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$ Where:

Y : Performance of Kigali City
 X_1 : Sustainable sourcing
 X_2 : Green recycling
 X_3 : Clean energy efficient
 X_4 : Transport and Urban Transporting
 β_0 : Intercept
 $\beta_1, \beta_2, \beta_3, \beta_4$: Slopes
 ε : Residual (error term)

IV. DATA PRESENTATION, INTERPRETATION AND ANALYSIS

The analysis of the data was done according to the aims of the study focused on the extent on how sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda, a case of Kigali city. The data to be analyzed was gathered by using questionnaires as well as interview guides and analyzed and interpreted according to the aims of the project.

➤ Demographic Respondent's Profile

This section gives detailed information about the profile of respondents who participated in this study in terms of gender, age, educational background, and experience.

Table 1 Demographics Profile of Respondents

		Frequency	Percent
Valid	Below 30	12	8.7
	Between 31-40	74	53.6
	Between 41-50	39	28.3
	51 years and above	13	9.4
Gender			
Valid	Male	92	66.7
	Female	46	33.3
Education qualification			
	PhD	4	2.9
	Master's degree	43	31.2
	Bachelor's degree	84	60.9
	Secondary level	5	3.6
Years of experience			
	Less than 1 year	19	13.8
	2-5 years	27	19.6
	6- 10 years	49	35.5
	11 years and above	43	31.2
Total		138	100

Source: Field Data (2026)

Table 1 indicates that majority of 74 respondents representing by 53.6% have the age group between 31-40, 12 respondents representing 8.7% have the age group below 30 years, 39 respondents representing 28.3% have the age group between 41-50years, and finally, 13 respondents representing by 9.4% have the age group between 51years and above; therefore, the largest number of employee categories working in City of Kigali have age ranged between 31 -40 years with the highest skills and knowledge who were able to respond

well with full information about the effect of sustainable supply chain management practices on the organizational performance of public institutions in Rwanda; other majority of 92 respondents representing 66.7% were male and 46 respondents representing 33.3% were female. In addition, the majority of 84 respondents, representing 60.9%, hold the bachelor's degree, followed by the second category of 43 respondents, representing 31.2%, who hold the master's degree, and finally the other 4 respondents, representing

2.9%, hold the PhD Doctorate. Therefore, the majority of employees of City of Kigali are effectively educated and qualified in different careers, and this helps them to perform well in their vacant positions. Also, this gives them the competence to understand the research instrument, execute their duties and responsibilities very well, and assure the researcher of receiving great and relevant information; finally, 19 respondents, representing 13.8%, belong to the period of less than 1 year, majority of 49 respondents, representing 35.5%, belong between the periods of 6 to 10 years; 27 respondents, representing 19.6%, belong between the periods of 2 to 5 years; and finally, 43

respondents, representing 31.2%, belong to the period of 11 years and above. Therefore, years of experience of City of Kigali show the extent on how sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda.

➤ Descriptive Statistics

By using appropriate data analysis, interpretation, and presentation techniques, researchers can generate meaningful insights, understand insights, and effectively communicate research findings.

Table 2 Descriptive Statistics on Sustainable Supply Chain Practices and Performance of Kigali City

Dimension	Statements	N	Mean	Std. Deviation	Comments
Sustainable Sourcing	Sustainable sourcing criteria helps Kigali City to reduce the environmental footprint of public sector activities	138	4.80	0.422	Very strong; Homogeneity
	By engaging with suppliers, Kigali City ensures that their suppliers are committed to sustainability	138	3.50	0.527	Weak; Heterogeneity
	With long-term viability, sustainable sourcing in Kigali City aims to minimize negative impacts and maximize positive outcomes across the entire supply chain	138	5.00	0.000	Very strong; Homogeneity
	By prioritizing eco-friendly materials and technologies, sustainable sourcing helps Kigali City in conserving natural resources and reduces waste	138	4.91	0.427	Very strong; Homogeneity
	Through reducing environmental impact, sustainable sourcing helps Kigali City in demonstrating a commitment to environmental responsibility	138	4.67	0.342	Very strong; Homogeneity
Green Recycling	By paper recycling materials, Kigali City creates a healthier planet and future generations	138	3.43	0.516	Weak; Heterogeneity
	With glass and metal recycling, Kigali City prevents pollution caused by extracting new raw materials and cuts carbon emissions	138	4.67	0.397	Very strong; Homogeneity
	Kigali City increases the amount of public recycling bins	138	5.00	0.000	Very strong; Homogeneity
	Recycling in Kigali City reduces the need to extract resources such as timber, water, and minerals for new products	138	4.93	0.407	Very strong; Homogeneity
	With plastic and organic waste recycling, Kigali City reduces the need for landfill and more costly forms of disposal	138	4.27	0.331	Very strong; Homogeneity
Clean Energy Efficiency	Energy-efficient lighting helps Kigali City to reduce operational costs	138	4.42	0.369	Very strong; Homogeneity
	Energy-efficient appliances also demonstrate Kigali City's responsible use of taxpayer funds	138	4.96	0.418	Very strong; Homogeneity
	Renewable energy sources in Kigali City contribute to environmental sustainability by lowering greenhouse gas emissions	138	5.00	0.000	Very strong; Homogeneity
	Clean energy efficiency helps Kigali City to stabilize electricity prices and volatility	138	4.70	0.483	Very strong; Homogeneity
	Smart building technologies in City of Kigali improve energy efficiency	138	4.00	0.000	Very strong; Homogeneity
Transport and Urban Planning	The role of transport in urban planning is centered on creating sustainable, equitable, and efficient cities	138	3.61	0.232	Weak; Heterogeneity
	Transport and urban planning are helpful in integration with land use	138	4.24	0.316	Very strong; Homogeneity
	Transport and urban planning in City of Kigali prioritizes sustainable and active modes	138	4.70	0.403	Very strong; Homogeneity

	Transport and urban planning in City of Kigali always ensures environmental sustainability and health	138	5.00	0.000	Very strong; Homogeneity
	Transport and urban planning in City of Kigali always supports climate goals and improves the overall health and quality of life for urban residents	138	4.00	0.000	Very strong; Homogeneity
Performance of Kigali City	Efficient resource allocation ensures that resources are directed to where they can have the greatest impact, maximizing public benefit	138	5.00	0.000	Very strong; Homogeneity
	Efficiency allows Kigali City to deliver services more effectively and efficiently, leading to better outcomes for citizens	138	4.33	0.361	Very strong; Homogeneity
	Cost-effectiveness analysis helps Kigali City to identify which programs and policies are most effective in achieving desired outcomes	138	4.95	0.427	Very strong; Homogeneity
	Kigali City ensures that public money and resources are used efficiently and effectively, preventing waste and misuse	138	5.00	0.000	Very strong; Homogeneity
	Kigali City's effective public sector interventions drive economic growth, reduce inequality, and promote social progress	138	3.59	0.286	Weak; Homogeneity

Source: Field Data (2026)

The consolidated findings show generally strong perceptions of sustainable supply chain practices and Kigali City's performance. Among the independent dimensions, the highest mean scores were recorded for long-term sustainable sourcing ($M = 5.00$, $SD = 0.000$), increasing public recycling bins ($M = 5.00$, $SD = 0.000$), renewable energy contribution to environmental sustainability ($M = 5.00$, $SD = 0.000$), and environmental sustainability and health in transport and urban planning ($M = 5.00$, $SD = 0.000$). The relatively lower ratings were observed for supplier commitment to sustainability under sustainable sourcing ($M = 3.50$, $SD = 0.527$), paper recycling ($M = 3.43$, $SD = 0.516$), and the role of transport in creating sustainable, equitable and efficient cities ($M = 3.61$, $SD = 0.232$). These results indicate areas where respondents' perceptions were comparatively less strong.

For Kigali City's performance, efficient resource allocation and effective use of public money both recorded the maximum mean of 5.00 ($SD = 0.000$), while cost-effectiveness analysis also recorded a very high mean of 4.95 ($SD = 0.427$). The lowest performance indicator was the contribution of public-sector interventions to economic growth, inequality reduction and social progress, with a mean of 3.59 ($SD = 0.286$).

➤ Inferential Statistics

Inferential statistics uses sample data to make conclusions or predictions about a larger sample or population. Therefore, the below section presents the correlational matrix, model summary, ANOVA Tests, and Coefficient regression.

Table 3 Correlation

		Performance of Kigali City	Sustainable sourcing	Green recycling	Clean energy efficient	Transport and urban planning
Performance of Kigali City	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	138				
Sustainable sourcing	Pearson Correlation	.868**	1			
	Sig. (2-tailed)	.000				
	N	138	138			
Green recycling	Pearson Correlation	.669**	.580**	1		
	Sig. (2-tailed)	.001	.006			
	N	138	138	138		
Clean energy efficient	Pearson Correlation	.461*	.400	-.073	1	

	Sig. (2-tailed)	.035	.072	.755		
	N	138	138	138	138	
Transport and urban planning	Pearson Correlation	.149	.091	-.132	-.091	1
	Sig. (2-tailed)	.521	.694	.567	.694	
	N	138	138	138	138	138
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Specifically, at the time when performance of City of Kigali is 100% is the time when sustainable sourcing varies at .868; this means that there is a strong relationship between

sustainable sourcing and City of Kigali's performance; also, when City of Kigali's performance is attained at 100%, the green recycling equalizes to .669.

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938 ^a	.880	.850	.156
a. Predictors: (Constant), Transport and urban planning, Clean energy efficient, Green recycling, Sustainable sourcing				

From table 4 above, R is the correlation coefficient, which shows the relationship between the study variables. The findings shown in the table above show a positive relationship between the study variables, as shown by 0.938 at the 1% significance level. Furthermore, the adjusted R squared equaled to 0.880 refers as the coefficient of determination, which explains the variation in the dependent variable due to changes in the independent variables.

Furthermore, the value of the adjusted R squared was 0.880, which is an indication that there was variation of 88.0% on the performance of City of Kigali due to changes in transport and urban planning, clean energy efficient, green recycling, as well as sustainable sourcing at a 95% confidence interval. This is an indication that 85% of the changes in performance could be accounted for by the independent variables.

Table 5 ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
1					
Regression	2.849	4	.712	29.306	.000 ^b
Residual	.389	133	.024		
Total	3.238	137			
a. Dependent Variable: Performance of Kigali City					
b. Predictors: (Constant), Transport and urban planning, Clean energy efficient, Green recycling, Sustainable sourcing					

If P-value < 5% -Model fit

If P-value > 5% -Model not fit

The model is fit to predict the study variables because P value < 0.05 or 5%.

Table 6 Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.889	.296		-3.000	.008
	Sustainable sourcing	.417	.123	.452	3.381	.004
	Green recycling	.611	.164	.457	3.719	.002
	Clean energy efficient	.611	.198	.331	3.088	.007
	Transport and urban planning	.222	.104	.198	2.138	.048
a. Dependent Variable: Performance of Kigali City						

From the regression equation above, it was found that holding all the stakeholders management to a constant zero, rehousing project performance will be -.889 percent, a unit increase in the use of sustainable sourcing would lead to increase the performance of City of Kigali at 41.7%, a one percent increase in the use of green recycling would lead the performance of City of Kigali at 61.1%, a one percent

increase in the use of clean energy efficient would lead to an increase the performance of City of Kigali at 61.1%, furthermore a one percentage increase in the use of transport and urban planning would lead to 22.2% increase the performance of City of Kigali. Overall, both the Green recycling and Clean energy efficient had the greatest effect on the performance of City of Kigali, followed by sustainable

sourcing, as well as transport and urban planning. At 5% level of significance and 95% level of confidence, transport and urban planning had 0.048 level of significance; green recycling had a 0.002 level of significance, sustainable sourcing had a 0.004 level of significance and finally clean

energy efficient had 0.007 level of significance. Therefore, all the variables were significant ($p < 0.05$).

$$Y = -.889 + 0.417X_1 + 0.611X_2 + .611X_3 + 0.222X_4 + \epsilon$$

Table 7 One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Performance of Kigali City	13.558	20	.000	1.190	1.01	1.37
Sustainable sourcing	13.000	20	.000	1.238	1.04	1.44
Green recycling	16.686	20	.000	1.095	.96	1.23
Clean energy efficient	22.000	20	.000	1.048	.95	1.15
Transport and urban planning	14.606	20	.000	1.143	.98	1.31

Table 6 indicates that sustainable sourcing, Green recycling, Clean energy efficient, and Transport and urban planning, all tested against a Test Value of 0. The results indicate that for all five variables, the calculated t-statistics are large (ranging from 13.000 to 22.000) with 20 degrees of

freedom (df). Crucially, the Significance (2-tailed) value is .000 for every variable, which is far less than the conventional $\alpha = 0.05$. This strong statistical evidence means that the Mean Difference (which ranges from 1.048 to 1.238) is significantly different from zero for all variables.

Table 8 Collinearity Diagnosticsa

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Sustainable sourcing	Green recycling	Clean energy efficient	Transport and urban planning
1	1	4.786	1.000	.00	.00	.00	.00	.00
	2	.105	6.749	.00	.10	.06	.00	.41
	3	.056	9.235	.02	.05	.08	.25	.23
	4	.045	10.266	.04	.43	.26	.02	.04
	5	.008	25.016	.93	.42	.61	.73	.31

a. Dependent Variable: Performance of Kigali City

Table 7 revealed that with the fifth dimension being the most critical for detecting multicollinearity, as indicated by its small Eigenvalue (0.008) and a high Condition Index (25.016). A Condition Index exceeding 15 or 30 is typically a cause for concern, with 25.016 suggesting potential moderate to high multicollinearity. The corresponding Variance Proportions in this fifth-dimension show that a significant portion (above 0.30 or 0.50) of the variance for Sustainable sourcing (0.42), Green recycling (0.61), Clean energy efficient (0.73), and Transport and urban planning (0.31) is attributed to this single, ill-conditioned dimension.

This pattern confirms that the independent variables are indeed highly intercorrelated, which could lead to unstable and unreliable regression coefficient estimates.

➤ Test of Hypotheses Results

The study analyzed the extent to which sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda, a case of Kigali city: A case of City of Kigali. Findings are below:

Table 9 Hypotheses Summary Results

	P-value	Decision
H₀₁: There is no significance relationship between sustainable sourcing and the performance of Kigali City.	.004	Rejected
H₀₂: There is no significance relationship between green recycling and the performance of Kigali City.	.002	Rejected
H₀₃: There is no significance relationship between clean energy efficient and the performance of Kigali City.	.007	Rejected
H₀₄: There is no significance relationship between transport and urban planning on performance of Kigali City.	.048	Rejected

Significant overviews on the extent to which sustainable supply chain management practices affect the organizational performance of public institutions in Rwanda, a case of Kigali city, are given by the findings of the hypotheses testing. There is strong evidence to refute the null hypothesis (H_{01} , H_{02} , H_{03} , and H_{04}) that these sustainable supply chain management practices have no significant effect on performance of Kigali City ($p < 0.05$). Specifically, sustainable sourcing, green recycling, clean energy efficient as well as transport and urban planning all demonstrate a significant effect on the performance of Kigali City. These findings emphasize the critical role of sustainable supply chain management practices on performance of public institutions in Rwanda generally.

V. CONCLUSION AND RECOMMENDATIONS

➤ Conclusion

Basing on the above findings, the study concluded that Kigali City's total performance is significantly improved by sustainable supply chain management techniques. For each of the indicators transport and urban planning, green recycling, sustainable sourcing, and clean energy efficiency the One-Sample t-test showed a very significant positive mean difference versus a test value of zero. This indicates that a significant portion of the respondents firmly believe that all of these sustainable strategies are successfully applied and improve the performance of the city. The results' consistency across all variables points to an effective, comprehensive plan for Kigali City's use of sustainability in governance and service provision.

Furthermore, investment in "Clean energy efficient" systems probably goes hand in hand with "sustainable sourcing" of the equipment, and "green recycling" facilities are frequently incorporated into "transport and urban planning." This collinearity makes it more difficult to isolate the distinct effects of each variable in a statistical regression model, but it also provides empirical evidence for an integrated and comprehensive approach to sustainability in which city performance is driven by the combined, synergistic impact of all the variables.

Finally, Kigali City performs far better when sustainable sourcing, green recycling, clean energy efficiency, and integrated transportation and urban planning are implemented. The strong association between these variables indicates that a cohesive, all-encompassing sustainable development plan, rather than a series of discrete projects, is responsible for Kigali's success. The crucial significance of SSCM in contemporary urban government is confirmed by the synergistic impact, which results in increased operational resilience, cost effectiveness, public accountability, and a higher standard of living for inhabitants.

➤ Recommendations

Below is a section that explains the recommendations per objective with regard to the findings obtained:

- City of Kigali should execute comprehensive energy audits across all municipal facilities (schools, hospitals, offices) and implement large-scale retrofitting projects centered on insulation, smart HVAC systems, and high-efficiency lighting.
- City of Kigali should emphasize future high-density residential and commercial zoning around critical public transport nodes (bus rapid transit stops, taxi ranks). By cutting commutes short and prioritizing walking, bicycling, and public transportation, this approach lessens the demand for private vehicle travel.
- City of Kigali should implement a policy requiring all public procurement decisions (for goods, services, and works) to prioritize Total Cost of Ownership (TCO) over initial price, this may generally incentivize suppliers to provide durable, energy-efficient, and easily recyclable products, maximizing long-term value and minimizing future waste and disposal costs.
- City of Kigali should develop a program to vet and certify local businesses that meet strict environmental and social sustainability criteria (e.g., fair labor, low emissions).
- City of Kigali may also move beyond general waste collection to a system that provides financial or service-based incentives to residents and businesses who consistently and correctly separate organic, dry, and potentially hazardous waste at the source, dramatically increasing the purity and value of recycled material.
- Finally, City of Kigali should upgrade recycling infrastructure to include technology for processing complex materials and integrate a controlled energy-from-waste facility to manage the small fraction of non-recyclable residual waste. This dual approach maximizes material recovery while generating clean energy and eliminating landfill use.

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